

2.11 Noise

<i>Issues (and Supporting Information Sources):</i>	<i>Potentially Significant Impact</i>	<i>Less Than Significant with Mitigation Incorporation</i>	<i>Less Than Significant Impact</i>	<i>No Impact</i>
11. NOISE—Would the project:				
a) Result in exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b) Result in exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
c) Result in a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
d) Result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e) For a project located within an airport land use plan area, or, where such a plan has not been adopted, in an area within two miles of a public airport or public use airport, would the project expose people residing or working in the area to excessive noise levels?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
f) For a project located in the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Setting

Noise Background

Sound is mechanical energy transmitted by pressure waves through a medium such as air. Noise can be defined as unwanted sound. Sound is characterized by various parameters that include the rate of oscillation of sound waves (frequency), the speed of propagation, and the pressure level or energy content (amplitude). In particular, the sound pressure level has become the most common descriptor used to characterize the loudness of an ambient sound level. Sound pressure level is measured in decibels (dB), with zero dB corresponding roughly to the threshold of human hearing, and 120 to 140 dB corresponding to the threshold of pain.

Sound pressure fluctuations can be measured in units of hertz (Hz), which correspond to the frequency of a particular sound. Typically, sound does not consist of a single frequency, but rather a broad band of frequencies varying in levels of magnitude (sound power). When all the audible frequencies of a sound are measured, a sound spectrum is plotted consisting of a range of frequency spanning 20 to 20,000 Hz. The sound pressure level, therefore, constitutes the additive force exerted by a sound corresponding to the sound frequency/sound power level spectrum.

The typical human ear is not equally sensitive to all frequencies of the audible sound spectrum. As a consequence, when assessing potential noise impacts, sound is measured using an electronic filter that de-emphasizes the frequencies below 1,000 Hz and above 5,000 Hz in a manner

corresponding to the human ear's decreased sensitivity to low and extremely high frequencies instead of the frequency mid-range. This method of frequency weighting is referred to as A-weighting and is expressed in units of A-weighted decibels (dBA).¹

Noise Exposure and Community Noise

An individual's noise exposure is a measure of the noise experienced by the individual over a period of time. A noise level is a measure of noise at a given instant in time. However, noise levels rarely persist consistently over a long period of time. In fact, community noise varies continuously with time with respect to the contributing sound sources of the community noise environment. Community noise is primarily the product of many distant noise sources, which constitute a relatively stable background noise exposure, with the individual contributors unidentifiable. Background noise levels change throughout a typical day, but do so gradually, corresponding with the addition and subtraction of distant noise sources and atmospheric conditions. The addition of short duration single event noise sources (e.g., aircraft flyovers, motor vehicles, sirens) makes community noise constantly variable throughout a day.

These successive additions of sound to the community noise environment vary the community noise level from instant to instant requiring the measurement of noise exposure over a period of time to legitimately characterize a community noise environment and evaluate cumulative noise impacts. This time-varying characteristic of environmental noise is described using statistical noise descriptors. The most frequently used noise descriptors are summarized below:

- L_{eq} : The equivalent sound level is used to describe noise over a specified period of time, typically one hour, in terms of a single numerical value. The L_{eq} is the constant sound level which would contain the same acoustic energy as the varying sound level, during the same time period (i.e., the average noise exposure level for the given time period).
- L_{max} : The instantaneous maximum noise level measured during the measurement period of interest.
- L_x : The sound level that is equaled or exceeded x percent of a specified time period. The L_{50} represents the median sound level.
- L_{dn} : The energy average of the A-weighted sound levels occurring during a 24-hour period, and which accounts for the greater sensitivity of most people to nighttime noise by weighting noise levels at night ("penalizing" nighttime noises). Noise between 10:00 p.m. and 7:00 a.m. is weighted (penalized) by adding 10 dBA to take into account the greater annoyance of nighttime noises.
- CNEL: Similar to the DNL, the Community Noise Equivalent Level (CNEL) adds a 5-dBA "penalty" for the evening hours between 7:00 p.m. and 10:00 p.m. in addition to a 10-dBA penalty between the hours of 10:00 p.m. and 7:00 a.m.

¹ All noise levels reported herein reflect A-weighted decibels unless otherwise stated.

Effects of Noise on People

The effects of noise on people can be placed into three categories:

- subjective effects of annoyance, nuisance, dissatisfaction;
- interference with activities such as speech, sleep, learning; and
- physiological effects such as hearing loss or sudden startling.

Environmental noise typically produces effects in the first two categories. Workers at industrial plants often experience noise in the last category. There is no completely satisfactory way to measure the subjective effects of noise, or the corresponding reactions of annoyance and dissatisfaction. A wide variation exists in the individual thresholds of annoyance, and different tolerances to noise tend to develop based on an individual's past experiences with noise.

Thus, an important way of predicting a human reaction to a new noise environment is the way the new noise compares to the existing noise levels to which one has adapted: the so called "ambient noise" level. In general, the more a new noise exceeds the previously existing ambient noise level, the less acceptable the new noise will be judged by those hearing it. With regard to increases in A-weighted noise level, the following relationships occur:

- Except in carefully controlled laboratory experiments, a change of 1 dBA cannot be perceived;
- Outside of the laboratory, a 3 dBA change is considered a just-perceivable difference when the change in noise is perceived but does not cause a human response;
- A change in level of at least 5 dBA is required before any noticeable change in human response would be expected; and
- A 10-dBA change is subjectively heard as approximately a doubling in loudness, and can cause an adverse response.

These relationships occur in part because of the logarithmic nature of sound and the decibel system. A ruler is a *linear* scale: it has marks on it corresponding to equal quantities of distance. One way of expressing this is to say that the ratio of successive intervals is equal to one. A *logarithmic* scale is different in that the ratio of successive intervals is not equal to one. Each interval on a logarithmic scale is some common factor larger than the previous interval. A typical ratio is 10, so that the marks on the scale read: 1, 10, 100, 1,000, 10,000, etc., doubling the variable plotted on the x-axis. The human ear perceives sound in a non-linear fashion, hence the decibel scale was developed. Because the decibel scale is based on logarithms, two noise sources do not combine in a simple additive fashion, rather logarithmically. For example, if two identical noise sources produce noise levels of 50 dBA, the combined sound level would be 53 dBA, not 100 dBA.

Noise Attenuation

Point sources of noise, including stationary mobile sources such as idling vehicles or onsite construction equipment, attenuate (lessen) at a rate of 6 dBA to 7.5 dBA per doubling of distance from the source, depending upon environmental conditions (e.g., atmospheric conditions, noise

barriers, type of ground surface, etc.). Widely distributed noises such as a large industrial facility spread over many acres or a street with moving vehicles (a “line” source) would typically attenuate at a lower rate of approximately 3 to 4.5 dBA per doubling distance from the source (also dependent upon environmental conditions) (Caltrans, 1998).

Existing Ambient Noise Environment

The Proposed Project encompasses an approximately 18.6-mile corridor of rural residential, agricultural, commercial, and open space areas. The Weed Segment encompasses an approximately 1.5-mile corridor of rural residential, open space, and industrial areas. The primary contributors to the noise environment along these corridors include vehicle traffic on highways and county roads; airplane overflights; sounds emanating from residential neighborhoods, including voices, noises from household appliances, and radio and television broadcasts; and naturally occurring sounds such as wind and wind-generated rustling. Additional noise sources may include electrical and industrial devices and other man-made localized sources. Generally, intermittent short-term noises do not significantly contribute to longer-term noise averages.

Ambient natural noise sources also include wind, which is much more common than calm conditions throughout the project area, and is expected to generate noise levels in the range of 45 to 55 dBA. Ambient L_{eq} noise levels in the vicinity of Grenada were measured to be 54 dBA. For the portions of the Proposed Project in the vicinity of Interstate 5 (I-5) and State Route 97 (SR 97), ambient levels are described below. Ambient levels described for SR 97 are applicable to the southern half of the Weed Segment.

Interstate 5

Measured L_{dn} noise levels near I-5 range from 75 dBA at a distance of approximately 180 feet, to 60 dBA at a distance of approximately 460 feet. The Proposed Project corridor crosses I-5 in two locations; one location is southeast of the Lucerne Substation and the other location is further south. The closest portion of the Weed Segment is located more than a half mile from I-5.

State Route 97

Measured L_{dn} noise levels near SR 97 range from 75 dBA at a distance of 120 feet from the roadway, to 60 dBA at a distance of 400 feet. SR 97 is located approximately 400 feet west of the closest portion of the Proposed Project corridor, near the Weed Junction Substation. The southern three quarters of a mile of the Weed Segment corridor is located approximately between 100 and 400 feet west of SR 97.

Sensitive Receptors

Human response to noise varies considerably from one individual to another. Effects of noise at various levels can include interference with sleep, concentration, and communication, and can cause physiological and psychological stress and hearing loss. Given these effects, some land uses are considered more sensitive to ambient noise levels than others. In general, residences, schools, hotels, hospitals, and nursing homes are considered to be the most sensitive to noise.

Places such as churches, libraries, and cemeteries, where people tend to pray, study, and/or contemplate are also sensitive to noise. Commercial and industrial uses are considered the least noise-sensitive.

Residences

Most of the residences within the Proposed Project and Weed Segment areas are located near the community of Grenada and the City of Weed. Other scattered residences are located throughout the project areas. There are at least seven residences within 100 feet of the Proposed Project corridor in the area of Grenada and at least four residences near the City of Weed within 100 feet of the southern portion of the Proposed Project corridor. Approximately two dozen residences in the Lincoln Heights neighborhood of the City of Weed are located within 100 feet of the Weed Segment corridor.

Recreation Areas

A park is located on the north side of the City of Weed that is approximately 1,000 feet from the Proposed Project corridor.

Cemetery

A small cemetery is located on the east side of the Lincoln Heights neighborhood, approximately 250 feet west of the Weed Segment corridor.

Regulatory Context

Federal, State, and local agencies regulate different aspects of environmental noise. Federal and State agencies generally set noise standards for mobile sources such as aircraft and motor vehicles, while regulation of stationary sources is left to local agencies. Local regulation of noise involves implementation of general plan policies and noise ordinance standards. Local general plans identify general principles intended to guide and influence development plans; local noise ordinances establish standards and procedures for addressing specific noise sources and activities.

Siskiyou County

The Siskiyou County General Plan Noise Element provides audible noise standards appropriate to the operations of the Proposed Project and the unincorporated areas of the Weed Segment. The General Plan identifies land use compatibility for community noise as shown below in Table 2.11-1. According to the General Plan, residences are the most sensitive land use. It sets a noise limit for residential land uses of 60 dBA. For new development within a residential land use area, noise limits range from 60 to 65 dBA with noise abatement features included. It should be noted that Siskiyou County does not have any laws or ordinances limiting construction noise (Siskiyou County, 2006).

**TABLE 2.11-1
SISKIYOU COUNTY LAND USE COMPATIBILITY FOR EXTERIOR COMMUNITY NOISE**

Land Use Category	Noise Ranges (L_{dn} , ^a dBA)			
	1	2	3	4
Passively Used Open Space (Auditoriums, Parks, Etc.)	50	50–55	55–70	70
Residential, Motels, Hospitals, Tec.	60	60–65	65–75	75
Office Buildings, Light Commercial, Heavy Commercial, Etc.	65	65–70	70–75	75

^a Day-night average sound level that is equal to the 24 hour A-weighted equivalent sound level with a 10 decibel penalty applied to nighttime levels.

Noise Range 1 – Acceptable land use, no noise abatement required.

Noise Range 2 – New construction or development, noise abatement features included.

Noise Range 3 – New construction or development, noise abatement only after detailed analysis of noise reduction requirements.

Noise Range 4 – New construction or development not allowed.

City of Weed

Municipal Code

The maximum permissible exterior sound levels by receiving land use for the City of Weed are presented in Table 2.11-2. Noise levels from construction and demolition equipment are exempt from the exterior and interior noise limits.

**TABLE 2.11-2
CITY OF WEED EXTERIOR NOISE LIMITS**

Receiving Land Zone	Time Period	Noise Level (dBA)	
		15 min Average	Maximum
Residential	10 p.m. – 7 a.m.	40	55
	7 a.m. – 10 p.m.	50	65
Multiple Dwelling, residential public places	10 p.m. – 7 a.m.	45	60
	7 a.m. – 10 p.m.	50	75
Limited commercial, multiple dwelling	10 p.m. – 7 a.m.	55	70
	7 a.m. – 10 p.m.	60	75
Commercial	10 p.m. – 7 a.m.	55	70
	7 a.m. – 10 p.m.	60	75
Industrial	Anytime	75	90

SOURCE: City of Weed, 2006

General Plan

The City of Weed General Plan identifies the Siskiyou County land use compatibility noise ranges (see Table 2.11-1) as the adopted City noise standards (City of Weed, 1987).

Noise Impacts and Mitigation Measures

Equipment noise during project construction is the primary concern in evaluating short-term noise impacts. During operation, noise from corona discharge along high-voltage transmission lines during wet conditions and noise from operation of additional equipment at substations would be the primary concern associated with long-term noise impacts.

Temporary impacts during construction are considered significant if they would substantially interfere with affected land uses. Substantial interference could result from a combination of factors including: the generation of noise levels substantially greater than existing ambient noise levels, construction efforts lasting long periods of time, or construction activities that would affect noise-sensitive uses during the nighttime.

The project's operational impact on the ambient noise environment would be considered substantial if it would result in ambient noise levels above 60 dBA (L_{dn}) if the existing noise environment is below 60 dBA. In areas where the existing ambient noise environment is already greater than 60 dBA, an ambient noise level increase of 3 dBA or more at a sensitive receptor would be considered substantial.

Evaluation of potential noise impacts from Proposed Project and Weed Segment construction and operation included reviewing relevant city and county noise standards and policies, characterizing the existing noise environment throughout the Proposed Project and Weed Segment areas, and projecting noise from construction and operation of Proposed Project and Weed Segment facilities. Impacts were assessed by comparing the published noise levels of construction equipment and operational activities to the ambient noise environment and significance criteria, based on applicable noise regulations.

- a) **Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies: *Less than significant with mitigation. See discussion under d).***
- d) **A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project: *Less than significant with mitigation.***

Potential noise impacts associated with construction and operation of the Proposed Project and Weed Segment include noise from construction equipment, corona discharge associated with high-voltage transmission lines, and operation of additional equipment at the Lucerne and Weed Substations.

Construction

Impact 2.11-1: The Proposed Project and Weed Segment could generate adverse noise levels during project construction. This would be a less than significant impact with implementation of Mitigation Measures 2.11-1a and 2.11-1b.

Construction of the Proposed Project and Weed Segment would consist of replacing the existing wood poles with new wood poles, establishing a new 1.6 mile ROW with wood poles, installing new conductor, and upgrading the Lucerne and Weed Substations. The majority of the transmission line construction activities would take place in open space and agricultural areas, though some construction activities would be in and adjacent to residential areas. Proposed Project construction activities are expected to last approximately four months, and the construction period for the Weed Segment is expected to last approximately eight months.

Construction noise sources are typically regulated on the local level through enforcement of noise ordinances, implementation of general plan policies, and imposition of conditions of approval for permits. Siskiyou County and the City of Weed do not have General Plan standards or Municipal Codes that address construction noise.

Construction of transmission lines and upgrading of substations would require a variety of equipment. During the construction period, noise levels generated by project construction would vary depending on the particular type, number, and duration of use of various pieces of construction equipment. Typical noise levels at 50 feet from the source for some of the heavy pieces of construction equipment that would be required to construct the Proposed Project and Weed Segment are listed in Table 2.11-3.

**TABLE 2.11-3
TYPICAL NOISE LEVELS FROM CONSTRUCTION EQUIPMENT**

Construction Equipment	Noise Level (dBA, L _{eq} at 50 feet)
Truck	88
Drill Rig	98
Air Compressor	81
Dozer	85
Grader	85
Mobile Crane	83

SOURCE: FTA, 2006.

As shown in **Table 2.11-3**, intermittent and continuous use of construction equipment would generate noise levels in excess of 85 dBA at 50 feet. This equates to a noise level of approximately 79 dBA at 100 feet or as high as 73 dBA at 200 feet. The duration of noise impacts would be relatively brief, estimated to be approximately one to three days at any one location along the Proposed Project and Weed Segment construction corridors.

Given this short duration of impacts at any one location, construction noise would not be considered significant at affected residences if the residents are given advance notice and if construction is limited to daytime hours. Implementation of the Mitigation Measures 2.11-1a and 2.11-1b would ensure that the impact of construction noise would be less than significant.

Mitigation Measure 2.11-1a: Construction activity within 2,000 feet of residences shall be limited to the least noise-sensitive daytime hours between 7:00 a.m. and 7:00 p.m., with some exceptions (as approved by the CPUC) as required for safety considerations or certain construction procedures that cannot be interrupted.

Mitigation Measure 2.11-1b: The following noise reduction and suppression techniques shall be employed during project construction to minimize the impact of temporary construction-related noise on nearby sensitive receptors:

- Comply with manufacturers' muffler requirements.
- Notify residences in advance of the construction schedule and how many days they may be affected. Provide a phone number for a construction supervisor who would handle construction noise questions and complaints.
- Minimize idling of engines; turn off engines when not in use, where applicable.
- Shield compressors and other small stationary equipment with portable barriers when within 100 feet of residences.
- Route truck traffic away from noise-sensitive areas where feasible.

Significance after Mitigation: less than significant.

Operation

Operation of Proposed Project and Weed Segment would include maintaining voltage across transmission lines and substations, which generate noise associated with corona discharge. In addition, line inspection activities would include the annual use of a light-duty truck or an all terrain vehicle to inspect the transmission line facilities along the Proposed Project and Weed Segment.

Operation of the transmission lines would generate random crackling or hissing noise associated with corona discharge, which occurs under high voltages. Corona discharge occurs when the voltage of the line exceeds the insulating capability of air. Corona is higher on foggy or rainy days because the air has a lower insulating ability when wet. Also, particles such as dust or water droplets that may come in contact with a conductor tend to increase corona discharge. Therefore, the potential for noise from corona discharge is greatest during wet weather.

Corona noise that would be associated with the Proposed Projects' 115 kV transmission line has been estimated to be approximately 20 dBA (PacifiCorp, 2006). During adverse weather conditions such as fog or rain, other 115 kV transmission lines have been estimated to typically generate between 30 and 40 dBA at 90 feet from the outer conductor (WIA, 1998), which would typically be below the ambient noise levels in the Proposed Project and Weed Segment areas. Because operation of the Proposed Project and Weed Segment transmission lines would not result in the generation of noise levels above 60 dBA L_{dn} at a sensitive receptor location, this would constitute a less than significant impact.

Operation of the Lucerne and Weed substations would not result in any appreciable increase to the existing average ambient noise levels at either substation site. The operation of additional new substation equipment at each of the substation sites would result in no audible increase to ambient noise levels (PacifiCorp, 2006). Therefore, operational substation impacts associated with the Proposed Project and Weed Segment would be less than significant.

b) Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels: *Less than significant.*

The use of blasting and/or pile drivers would not be included as part of the Proposed Project or Weed Segment. The Proposed Project and Weed Segment would involve temporary sources of groundborne vibration and groundborne noise during construction from operation of heavy equipment. During Proposed Project and Weed Segment construction, operation of heavy equipment would generate localized groundborne vibration and groundborne noise that could be perceptible at residences or other sensitive uses in the immediate vicinity of the construction corridor. However, since the duration of impact at any one location along the corridors would be very brief (estimated to be from one to three days) and since the impact would occur during less sensitive daytime hours (i.e., between 7:00 a.m. and 7:00 p.m.), the impact from construction-related groundborne vibration and groundborne noise would be less than significant. Implementation of Mitigation Measures 2.11-1a and 2.11-1b would further ensure that this impact would remain less than significant.

c) Permanent increase in ambient noise levels in the project vicinity above levels existing without the project: *Less than significant.*

As discussed in d), above, the only permanent noise sources that would be introduced by the Proposed Project and Weed Segment would be the hissing or crackling noise associated with corona discharge during wet weather conditions and the noise associated with the new substation equipment. However, this increase would not be considered significant, as it would not increase ambient noise levels by 3 dBA or more. Therefore, the long-term impact of the Proposed Project and Weed Segment on ambient noise levels in the project area would be less than significant.

- e) **Expose people residing or working in the area to excessive noise levels if the project is located within an airport land use plan area, or, where such a plan has not been adopted, in an area within two miles of a public airport or public use airport, would the project expose people residing or working in the area to excessive noise levels: *No impact.***

The Proposed Project and Weed Segment would not involve the development of noise-sensitive land uses, and thus, would not expose people to excessive aircraft noise.

- f) **Expose people residing or working in the project area to excessive noise levels if the project is located in the vicinity of a private airstrip, would the project expose people residing or working in the area to excessive noise levels: *No impact.***

The Proposed Project and Weed Segment are not in the vicinity of a private airstrip.

References – Noise

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